REMARKS

The Examiner has rejected claims 7, 8, and 10-12 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application No. 2005/0020730 to Valentini et al ("Valentini"). The Examiner has rejected claims 1, 2, and 4-6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2003/0073759 to Koga et al ("Koga"). The Examiner has rejected claims 7, 8, and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,440,203 to Kato ("Kato"). Finally, the Examiner has rejected claims 7 and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2004/0024086 to Segawa et al ("Segawa"). Claims 1, 2, 4-8, and 10-12 are currently pending. The following remarks are considered by applicant to overcome each of the Examiner's outstanding rejections to current claims 1, 2, 4-8, and 10-12. An early Notice of Allowance is therefore requested.

I. SUMMARY OF RELEVANT LAW

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The determination of obviousness rests on whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. In determining obviousness, four factors should be weighed: (1) the scope and content of the prior art, (2) the differences between the art and the claims at issue, (3) the level of ordinary skill in the art, and (4) whatever objective evidence may be present. Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. The Examiner carries the burden under 35 U.S.C. § 103 to establish a prima facie case of obviousness and must show that the references relied on teach or suggest all of the limitations of the claims.

II. REJECTION OF CLAIMS 7, 8, AND 10-12 UNDER 35 U.S.C. § 102(E) BASED ON VALENTINI

In paragraphs 2 and 7 of the current Office Action, the Examiner rejects claims 7-12 under 35 U.S.C. § 102(e) as being anticipated by Valentini. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Valentini's 102(e) date is May 19, 2003. The current application claims priority to JP 2002-277600 filed on September 24, 2002. A verified translation of the priority document has been previously filed in this case. As a result, the date of invention for the current application predates the 102(e) date of Valentini. Thus, Valentini cannot be a proper 102(e) reference against the current application.

The Examiner has indicated in paragraph 7 that the current application is not entitled to the priority date of the priority document, because "there appears to be no disclosure in the foreign priority document regarding the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer as presently claimed." However, as explained below, this misinterprets the disclosure of the verified translation of the priority document ("Verified Translation").

It should first be noted that all that is required of the disclosure of the Verified Translation is that it disclose that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer **may** be 0.5 to 2 on the basis of weight. It is **not required** that the Verified Translation disclose that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer **must** be 0.5 to 2 on the basis of weight.

The priority document clearly states that "[i]t is preferable that the blending amount of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether is preferably 0.2 to 10 % by weight with respect to the total amount of the ink for ink-jet recording of the present invention." Verified Translation, ¶ [0014]. The priority document also clearly states that the blending amount of the acrylic polymer "is preferably 0.1 to 5.0 % by weight with respect to the total amount of the ink for ink-jet recording of the present invention." Verified Translation, ¶ [0012].

This disclosure of the range of weight percentages means that the Verified Translation specifically discloses that the ink for ink-jet recording of the present invention may contain (1) 0.2% by weight of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether and (2) 0.4% by weight of the acrylic polymer. This

means that the Verified Translation discloses that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer may be 0.5 (0.2% / 0.4% = 0.5).

The disclosure of the range of weight percentages also means that the Verified Translation specifically discloses that the ink for ink-jet recording of the present invention may contain (1) 10% by weight of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether and (2) 5.0% by weight of the acrylic polymer. This means that the Verified Translation discloses that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer may be 2 (10% / 5.0% = 2).

The disclosure of the **range** of weight percentages also means that the Verified Translation not only discloses that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer may be either 0.5 or 2, but also discloses that the blending ratio can be anything between 0.5 and 2. Thus, the language of Claim 7 that "a blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer is 0.5 to 2 on the basis of weight", is in fact supported by the disclosure of the Verified Translation.

The verified translation discloses, in Examples 4 and 5, ink compositions each including dipropylene glycol normal propyl ether and acrylic polymer. See paragraphs [0030] – [0033].

Specifically, from Table 4 (paragraph [0031]) showing the ink composition of Example 4, it is calculated that the ratio on the basis of % by weight of dipropylene glycol normal propyl ether with respect to acrylic polymer is 2 (= (dipropylene glycol normal propyl ether: 1% by weight) / (polyacrylic acid sodium salt as the acrylic polymer: 0.5% by weight)).

Further, from Table 5 (paragraph [0033]) showing the ink composition of Example 5, it is calculated that the ratio on the basis of % by weight of dipropylene glycol normal propyl ether with respect to acrylic polymer is 0.67 (≈ (dipropylene glycol normal propyl ether: 1% by weight) / (salt of copolymer of acrylic acid/sulfonic acid monomer as the acrylic polymer: 1.5% by weight)).

Namely, Example 4 in the verified translation discloses the ratio of "2" which supports the upper limit of "2" in the range of 0.5 to 2 of the blending ratio of the dipropylene glycol normal propyl either with respect to the acrylic polymer on the basis of weight as recited in claim 7; and Example 5 of the verified translation discloses the ratio of "0.67" which is within the range of 0.5 to 2 of the blending ratio as recited in claim 7.

Therefore, Applicants respectfully request that Examiner remove the rejection of claims 7, 8, and 10-12 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application No. 2005/0020730 to Valentini et al.

III. REJECTION OF CLAIMS 1, 2, AND 4-6 UNDER 35 U.S.C. § 103(A) BASED ON KOGA

In paragraphs 4 and 7 of the current Office Action, the Examiner rejects claims 1, 2, and 4-6 under 35 U.S.C. § 103(a) as being unpatentable over Koga. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Koga's 102(a) date is April 17, 2003. The current application claims priority to JP 2002-277600 filed on September 24, 2002. A verified translation of the priority document has been previously filed in this case. As a result, the date of invention for the current application predates the 102(a) date of Koga.

In addition, Koga and the current invention were, at the time the current invention was made, both owned by, or subject to an assignment to, Brother Kogyo Kabushiki Kaisha. As a result, Koga is not available as a 102(e)/103 reference according to 35 U.S.C. 103(c).

The Examiner has indicated in paragraph 7 that the current application is not entitled to the priority date of the priority document, because "there appears to be no disclosure in the foreign priority document regarding the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer as presently claimed." However, as explained below, this misinterprets the disclosure of the verified translation of the priority document ("Verified Translation").

It should first be noted that all that is required of the disclosure of the Verified Translation is that it disclose that the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer **may** be 0.5 to 2 on the basis of weight. It is **not required** that the Verified Translation disclose that the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer **must** be 0.5 to 2 on the basis of weight.

The priority document clearly states that "[i]t is preferable that the blending amount of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether is preferably 0.2 to 10 % by weight with respect to the total amount of the ink for

ink-jet recording of the present invention." Verified Translation, ¶ [0014]. The priority document also clearly states that the blending amount of the acrylic polymer "is preferably 0.1 to 5.0 % by weight with respect to the total amount of the ink for ink-jet recording of the present invention." Verified Translation, ¶ [0012].

This disclosure of the range of weight percentages means that the Verified Translation specifically discloses that the ink for ink-jet recording of the present invention may contain (1) 0.2% by weight of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether and (2) 0.4% by weight of the acrylic polymer. This means that the Verified Translation discloses that the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer may be 0.5 (0.2% / 0.4% = 0.5).

The disclosure of the range of weight percentages also means that the Verified Translation specifically discloses that the ink for ink-jet recording of the present invention may contain (1) 10% by weight of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether and (2) 5.0% by weight of the acrylic polymer. This means that the Verified Translation discloses that the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer may be 2 (10% / 5.0% = 2).

The disclosure of the **range** of weight percentages also means that the Verified Translation not only discloses that the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer may be either 0.5 or 2, but also discloses that the blending ratio can be anything in the range between, and including, 0.5 and 2. Thus, the language of Claim 1 that "a blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer is 0.5 to 2 on the basis of weight", is in fact supported by the disclosure of the Verified Translation.

The verified translation discloses, in Examples 1 to 3, ink compositions each including tripropylene glycol normal butyl ether and acrylic polymer. See paragraphs [0024] – [0029].

Specifically, from Table 1 (paragraph [0025]) showing the ink composition of Example 1, it is calculated that the ratio on the basis of % by weight of tripropylene glycol normal butyl ether with respect to acrylic polymer is 1 (= (tripropylene glycol normal butyl ether: 1% by weight) / (polyacrylic acid sodium salt as the acrylic polymer: 0.5% by weight)). From Table 2 (paragraph [0027]) showing the ink composition of Example 2, it is calculated that the ratio on the basis of % by weight of tripropylene glycol normal butyl ether with respect to acrylic polymer is 2 (= (tripropylene glycol normal butyl ether: 1% by weight)

/ (ammonium salt of styrene-acrylic acid copolymer as the acrylic polymer: 0.5% by weight)).

Further, from Table 3 (paragraph [0029]) showing the ink composition of Example 3, it is calculated that the ratio on the basis of % by weight of tripropylene glycol normal butyl ether with respect to acrylic polymer is 0.5 (= (tripropylene glycol normal butyl ether: 0.5% by weight) / (ammonium salt of styrene-acrylic acid copolymer as the acrylic polymer: 1% by weight)).

Namely, Examples 1 and 2 in the verified translation disclose the ratio of "2" which supports the upper limit of "2" in the range of 0.5 to 2 of the blending ratio of the tripropylene glycol normal butyl ether with respect to the acrylic polymer on the basis of weight as recited in claim 1; and Example 3 of the verified translation discloses the ratio of "0.5" which supports the lower limit of "0.5" in the range of o.5 to 2 of the blending ratio as recited in claim 1.

Therefore, Applicants respectfully request that Examiner remove the rejection of claims 1, 2, and 4-6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2003/0073759 to Koga et al.

IV. REJECTION OF CLAIMS 7, 8, AND 10-12 UNDER 35 U.S.C. § 103(A) BASED ON KATO

In paragraphs 5 and 7 of the current Office Action, the Examiner rejects claims 7, 8, and 10-12 under 35 U.S.C. § 103(a) as being anticipated by Kato. This rejection is respectfully traversed and believed overcome in view of the following discussion.

With respect to this rejection, Examiner contends Kato discloses an ink-jet ink comprising water, 0.1-10% self-dispersing carbon black, acrylic resin which is a dispersant for a second colorant present in the ink, and 1-20% solvent such as dipropylene glycol mono-n-propyl ether. Office Action (8/29/06), P. 5, ¶ 6 (citing Kato, Col. 1, Lns. 9-10; Col. 2, Lns. 33-35 and 40-41; Col. 3, Lns. 55-58; Col. 4, Lns. 43-48; Col. 5, Ln. 3; Col. 7, Lns 42-46; Col. 8, Lns. 2-3 and 6-8; Col. 14, Lns. 3-9).

A. CLAIM 7

Amended Claim 7 states that "a blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer is 0.5 to 2 on the basis of weight."

The acrylic polymer has a first property in which it is adsorbed to the coloring agent, and also a second property in which it is localized in the vicinity of the gas-liquid interfaces and solid-liquid interfaces in the ink. If there is not any compound affecting the acrylic polymer in the ink, the first and the second properties of the acrylic polymer are well balanced (equilibrium) depending on the strength of one of the properties.

That is, in ordinary cases, an excessive amount of the acrylic polymer, which is not adsorbed to the coloring agent, has been localized by the surface activity in the vicinity of the surfaces of the ink droplets (gas-liquid interfaces and solid-liquid interfaces) in the ink for ink-jet recording containing the acrylic polymer. Application, ¶ [0013]. Therefore, when the ink droplets are adhered to portions disposed around the nozzle of the recording head, and the water is evaporated, then the concentration of the acrylic polymer is extremely increased in the vicinity of the surfaces of the ink droplets to form sticky or cohesive residues having high viscosities which behave as the obstacle to inhibit the straight travel stability of the ink droplets during the discharge of the ink from the nozzle. *Id.*

When the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether is contained in the ink for ink-jet recording containing the acrylic polymer, the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether exists in the vicinity of the surfaces of the ink droplets in place of the acrylic polymer, because the ethers have a stronger surface-activating function as compared with the acrylic polymer. *Id.* As a result, the localization of the acrylic polymer is avoided on the ink droplet surfaces, and most of acrylic polymer tends to be adsorbed to the coloring agent. *Id.* In order to cause such adsorption of the acrylic polymer to the coloring agent, a particular amount of the tripropylene glycol normal butyl ether and/or dipropylene glycol normal propyl ether with respect to the acrylic polymer is needed.

At one end, it has been found that a minimum of 0.5 of the tripropylene glycol normal butyl ether and/or dipropylene glycol normal propyl ether with respect to the acrylic polymer is needed. See Application, ¶ [0014] and Examples. At the other end, if the blending ratio exceeds a maximum of 2, the phenomenon of tripropylene glycol normal butyl ether and/or dipropylene glycol normal propyl ether localization in the vicinity of the gas-liquid interfaces has been saturated and the tripropylene glycol normal butyl ether or dipropylene glycol normal propyl ether also affects the adsorption of acrylic polymer to the coloring agent. Accordingly, the acrylic polymer, that was once adsorbed to the coloring agent and is now free, might replace some of the tripropylene glycol normal butyl ether or dipropylene glycol normal propyl ether that exists in the vicinity of the surfaces of the ink droplets.

Therefore, it is desired that the blending ratio is not more than 2. See Application ¶ [0014] and Examples. Thus, the blending ratio 0.5 to 2 of tripropylene glycol normal butyl ether or dipropylene glycol normal propyl ether with respect to the acrylic polymer is important for the effect of the tripropylene glycol normal butyl ether or dipropylene glycol normal propyl ether.

With respect to Claim 7, Examiner contends that Kato discloses the ratio of dipropylene glycol mono-n-propyl ether to acrylic resin is 0.04 to 20. Office Action (8/29/06), P. 5. Examiner, in effect, argues that while not all inks with the disclosed amounts of glycol ether and acrylic polymer in Kato fall within the claimed ratio range of 0.5-2 of the current application, some combinations do fall within that range. However, Kato never discloses any specific examples falling within the claimed range. In addition, the disclosed ratio of Kato is 0.04 to infinity, as Kato discloses no upper limit of this ratio.

Kato states that "the weight ratio of the first colorant to the pigment contained in the second colorant in the ink composition is in the range of 1:3 to 7:1...." Kato, Col. 4, Lns. 42-47. Kato also states that the total amount of the first colorant and the pigment contained in the second colorant is not more than 20% by weight based on the ink composition. See, Kato, Col.4, Lns. 48-52. Since no lower range of the total amount of the first colorant and the pigment contained in the second colorant is disclosed, it could be as low as zero. Thus the range of the total amount of the first colorant and the pigment contained in the second colorant is 0 to 20% by weight based on the ink composition. As a result, Kato discloses that the amount of pigment is 0 (0/[7+1] x 7) to 15% (20/[1+3] x 3) by weight based on the ink composition. Kato then goes on to state that the amount of the acrylic resin is in the range of 5 to 150% by weight based on the pigment. See, Kato, Col. 7, Lns. 42-46. As a result, Kato discloses that the amount of acrylic resin is 0 (0 x 0.05) to 22.5% (15 x 1.5) by weight based on the ink composition. Kato also explicitly states that "[t]he amount of the glycol ether added is in the range of 1 to 20% by weight...." Kato, Col. 8, Lns. 6-7. Therefore, Kato also discloses that the ratio of the glycol ether with respect to the acrylic polymer is at least 0.044 (1/22.5) to infinity (20/0) on the basis of weight. As a result, range claimed in the current invention of 0.5 to 2 is much narrower than the range disclosed in Kato.

Even after Applicants have explicitly set forth above how the amount of acrylic resin, as well as the ratio of the glycol ether with respect to the acrylic polymer, in Kato was calculated based on the disclosure of Kato, the Examiner still erroneously maintains that maintains that Kato discloses that the amount of acrylic resin to be from 0.75 to 22.5%,

and that the ratio of the glycol ether with respect to the acrylic polymer is 0.04 to 20. Moreover, unlike the Applicants have done, the Examiner cites no specific calculations in support of Examiner's assertions.

In paragraph 5 of the current Office Action, the Examiner states that the totality of this rejection is set forth in paragraph 7 of the office action mailed 8/29/06, and is incorporated in the current Office Action by reference. In the 8/29/06 Office Action, the entire support for Kato's disclosure of a range of acrylic resin is that "it is calculated that the acrylic resin is present in amount of 0.75-22.5%." As discussed above, Applicants have been able to arrive at Examiner's upper limit of 22.5%, but not Examiner's lower limit. Applicants assert that Examiner has no support whatsoever for Examiner's claim that the lower limit of the acrylic resin in Kato is 0.75%. Applicants believe that the Examiner's erroneous statement of the lower limit of the acrylic resin in Kato stems from the Examiner's misinterpretation of Kato's disclosure of the amount of colorant.

As stated above, Kato only states that the total amount of the first colorant and the pigment contained in the second colorant is not more than 20%. No lower limit is stated, and Examiner does not assert otherwise. Applicants assert that this language reads on zero being the lower limit. Examiner, on page 6 of the current Office Action, asserts that Kato's disclosure does not read on zero, because "Kato always requires the presence of some finite amount of colorant...." However, the Examiner admits that "the amount of colorant includes very small amounts...."

While Applicants disagree with the Examiner's interpretation of Kato, assuming that Examiner is right and some amount of colorant must be present, Examiner does not disagree that no lower limit of the amount of colorant is set forth in Kato. This means that the "very small amount" required by Kato, according to the Examiner, could be 0.01%, or 0.001%, or 0.0001%, ad infinitum. Mathematically, this means that, while not exactly equaling zero, the unspecified lower limit of colorant in Kato can be so small that it **approaches** zero. Thus, for all intents and purposes of mathematical calculations, you can take the lower limit of the colorant to be zero. The Examiner does not argue with this logic, nor can the Examiner argue with this logic as it is basic mathematics. As such, all of Applicants' calculations are completely accurate and consistent.

The ramifications of Kato disclosing that the amount of the colorant can be so infinitesimal as to approach zero dictate that the exact calculation for the lower limit of the acrylic resin is as follows:

$$A_L = P_L \times A_{LP}, \text{ as } P_L \to 0;$$

where A_L is the lower limit of the acrylic resin in the ink, P_L is the lower limit of the pigment in the ink, and A_{PL} is the lower limit of the acrylic resin in comparison to the pigment.

Since, as previously stated, the lower limit of the pigment in the ink (P_L) is so small that it approaches zero, the lower limit of the acrylic resin (A_L) also must approach zero. This means that the upper limit of the ratio of the glycol ether with respect to the acrylic polymer is as follows:

$$R_U = \frac{G_U}{A_L}, \text{ as } A_L \to 0;$$

where R_U is the upper limit of the ratio of the glycol ether with respect to the acrylic polymer in the ink, G_U is the upper limit of the glycol ether in the ink, and A_L is the lower limit of the acrylic resin in the ink.

Since, as previously stated, the lower limit of the acrylic resin in the ink (A_L) is that it is so small it approaches zero, then as the lower limit of the acrylic resin (A_L) continues to decrease, the upper limit of the ratio of the glycol ether with respect to the acrylic polymer in the ink (R_U) continues to increase. Since the lower limit of the acrylic resin in the ink (A_L) never stops decreasing, the upper limit of the ratio of the glycol ether with respect to the acrylic polymer in the ink (R_U) never stops increasing. Therefore, the upper limit of the ratio (R_U) continues to infinity. To dispute this mathematical fact, the Examiner needs to do more than merely assert Examiner disagrees. The Examiner must affirmatively show how Applicants' mathematical computations are incorrect. Until the Examiner does so, Applicants assert that the ratio of the glycol ether with respect to the acrylic polymer in the ink, as disclosed by Kato, must be taken to be 0.04 to infinity.

The MPEP provides instruction for situations like this:

> When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. ... If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of **unexpected results** within the claimed narrow range ... it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious. The question of "sufficient specificity" is similar to that of "clearly envisaging"

> a species from a generic teaching. See MPEP § 2131.02. A 35 U.S.C. 102/103 combination rejection is permitted if it is unclear if the reference teaches the range with "sufficient specificity." **The examiner must, in this case, provide reasons for anticipation as well as a motivational statement regarding obviousness.**

MPEP § 2131.03[II] (emphasis added).

1. Unexpected Results

The unexpected result in this case is that, when an acrylic polymer is used in an ink, the requirements for straight travel stability of ink droplets during the discharge, recovery performance upon introduction into the recording head, fixation performance of printed matters, and drying performance after printing can be met by adjusting the blending ratio of dipropylene glycol normal propyl ether with respect to the acrylic polymer to be from 0.5 to 2 on the basis of weight.

The inventors of the present application discovered, among numerous combinations, that the combination of dipropylene glycol normal propyl ether and the acrylic polymer, in the specified proportional range of Claim 7, is excellent in straight travel stability, recovery performance, fixation performance, and drying performance as indicated in Table 12 of the present application.

Before Applicants' discoveries, adding an acrylic polymer to improve the recovery performance upon introduction into the recording head and improve the fixation performance, resulted in unstable discharge from the recording head and deteriorated straight travel stability of ink droplets. Application (as published), P. 1, ¶¶ [0007]-[0008]. It was unexpected that adding dipropylene glycol normal propyl ether, such that the blending ratio of dipropylene glycol normal propyl ether with respect to the acrylic polymer is 0.5 to 2 on the basis of weight, would stabilize discharge from the recording head and improve straight travel stability while maintaining the improved fixation performance. Because of this unexpected result, Applicants respectfully assert that the narrow claimed ratio range of 0.5 to 2 is not disclosed by Kato with "sufficient specificity" to constitute an anticipation of the claims.

2. No Reason for Anticipation or Motivation for Obviousness

Kato provides neither reason for anticipation nor any motivation regarding obviousness. First, Kato never discloses any effect on straight travel stability or recording head discharge stability by adding dipropylene glycol normal propyl ether to an ink

containing an acrylic polymer. The glycol ethers of Kato are disclosed as being penetrating agents. Kato, Col. 7, Lns. 47-52. As such there is no reason for anticipation of the unexpected results of the current application that modifying the proportion of dipropylene glycol normal propyl ether to the acrylic polymer, such that their blending ratio is 0.5 to 2 on the basis of weight, improves the straight travel stability while maintaining the improved recovery performance and fixation performance obtained by the addition of the acrylic polymer.

Second, Kato teaches improving color development and fixation by the addition of a first and second colorant to the ink. Kato, Col. 3, Lns. 61-65. Never does Kato discuss any interaction between dipropylene glycol normal propyl ether and an acrylic polymer. In fact, the acrylic polymer in Kato is disclosed as a dispersant for the second colorant, rather than for use to improve recovery performance and fixation performance. Kato, Col. 3., Lns. 66-67; Col. 5, Lns. 1-7 and 45-50.

As a result, Kato provides no motivation to solve the problems addressed in the current application by modifying the proportion of dipropylene glycol normal propyl ether to the acrylic polymer. As such, Kato does not render the narrowly claimed ratio range of 0.5 to 2 obvious.

Examiner asserts that Kato renders Claim 7 obvious because the claimed range of 0.5 to 2 of Claim 7 lies inside the range of 0.04 to infinity disclosed in Kato. 8/29/06 Office Action, P. 4, 8. While this may be true in some cases, it is not so in the present case. As stated above, the narrower claimed range of 0.5 to 2 of Claim 7 has unexpected results. These unexpected results negate the fact that the claimed range lies within the range disclosed in Kato, and renders Claim 7 unobvious. See MPEP § 2131.03. It would not have been obvious to one of ordinary skill in the art to modify the disclosed range of 0.04 to infinity to come up with the claimed range of 0.5 to 2 because, as stated above, the results were unexpected.

Furthermore, Examiner asserts that there is no evidence in the Application to support the asserted unexpected results. However, Table 12 provides just such evidence. Examples 4 and 5 contain dipropylene glycol normal propyl ether in the specified ratio. As discussed above, the specification clearly sets forth what happens outside of that ratio. This demonstrates the importance of the ratio being within the range of 0.5 to 2.

Examiner asserts that the comparative data set forth in Table 12 in the present specification establishes the criticality of using dipropylene glycol normal propyl ether and acrylic polymer, not the criticality regarding the ratio of the amount of dipropylene glycol normal propyl ether to the amount of acrylic polymer. Applicant respectfully disagrees. All

that is required is that the evidence show unexpected results when using the ratio recited in Claim 7 as compared to a ratio disclosed in the reference Kato which falls outside the ratio of Claim 7.

As discussed above, Kato discloses a ratio of dipropylene glycol normal propyl ether to acrylic polymer of 0.04 to infinity. While Examiner may dispute this, Applicants have more than adequately proven this mathematically. Examiner admits that Table 12 discloses information related to compositions that fall within the claimed ratio. All that is disputed is whether Table 12 discloses information related to a ratio outside that of Claim 7, but inside that of Kato. Applicants assert that Comparative Example 1 satisfies this requirement. The ratio of dipropylene glycol normal propyl ether to acrylic polymer in Comparative Example 1 is infinity. This is within the range disclosed by Kato. Therefore, Applicants have sufficiently displayed that the narrow range of Claim 7 has unexpected results when compared to the broad range of Kato.

In addition, the Examiner asserts that the range of Claim 7 lies inside of the range of Kato, and that, therefore, a *prima facie* case of obviousness exists. Office Action (3/23/07), P. 9 (referring to MPEP 2144.05). Applicant's respectfully assert that such a *prima facie* case does not exist in this case.

For a prima facie case to exist, MPEP 2144.05 requires that the prior art disclose a range. If the prior art disclosed no ratio range, but only disclosed the presence of dipropylene glycol normal propyl ether and acrylic polymer, then there is no doubt that a prima facie case would not exist. For example, if a claim covered an ink with 1-2% by weight of pigment, and the prior art only disclosed the presence of a pigment with no specified amount, then no *prima facie* case would exist, even though the prior art *implicitly* discloses a range of 0-100%. No *prima facie* case would exist because the prior art did not disclose a specific range. In the present case, Claim 7 recites that the ratio of dipropylene glycol normal propyl ether to acrylic polymer is 0.5 to 2. Kato discloses no specific ratio of dipropylene glycol normal propyl ether to acrylic ether. Rather, Kato *implicitly* discloses a ratio of dipropylene glycol normal propyl ether to acrylic polymer of 0.04 to ∞ (infinity). In fact, this disclosure is so indirect that the Examiner incorrectly calculated that the disclosed range in Kato is 0.04 to 20. The disclosure of Kato is so similar to the *implicit* disclosure of 0-100% discussed above that its disclosure is inadequate to provide a *prima facie* case of obviousness of Claim 7.

Because Applicants have established a case of unexpected results of the claimed ratio of dipropylene glycol normal propyl ether to acrylic polymer, and because

Examiner has failed to establish a *prima facie* case of obviousness due to the inadequacies of Kato's disclosure, Applicants respectfully assert that Claim 7 is not rendered obvious by Kato. Therefore, Applicants respectfully request that Examiner remove the rejection of Claim 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,440,203 to Kato.

B. CLAIM 8

Claim 8 is dependant upon Claim 7. As Claim 7 is allowable, so must be Claim 8. Therefore, Applicants respectfully request that Examiner remove the rejection of Claim 8 under 35 U.S.C. § 103(a) as being anticipated by U.S. Patent No. 6,440,203 to Kato.

C. CLAIM 10

Claim 10 states that "a content of the dipropylene glycol normal propyl ether is 0.5 to 5% by weight with respect to a total amount of the ink."

With respect to this claim, Examiner contends that, since Kato discloses the glycol ether can be in the range of 1-20% it anticipates the claimed range. 7/13/05 Office Action, P. 4, ¶ 6. However, Kato never discloses any specific examples falling within the claimed range. In addition, the range disclosed in Kato both overlaps and is larger than the narrowly claimed range in the current application.

As with Claim 7 above, the MPEP provides instruction for situations like this. MPEP § 2131.03[II].

1. Unexpected Results

The unexpected result in this case is that, when an acrylic polymer is used in an ink, the requirements for straight travel stability of ink droplets during the discharge, recovery performance upon introduction into the recording head, fixation performance of printed matters, and drying performance after printing can be met by the addition of dipropylene glycol normal propyl ether in the range of 0.5 to 5% by weight with respect to a total amount of the ink.

The inventors of the present application discovered, among numerous combinations, that the combination of the acrylic polymer and dipropylene glycol normal propyl ether, in the specified range of Claim 10, is excellent in straight travel stability, recovery performance, fixation performance, and drying performance as indicated in Table 12 of the present application.

Before Applicants' discoveries, adding an acrylic polymer to improve the recovery performance upon introduction into the recording head and improve the fixation

performance, resulted in unstable discharge from the recording head and deteriorated straight travel stability of ink droplets. Application (as published), P. 1, ¶¶ [0007]-[0008]. It was unexpected that adding dipropylene glycol normal propyl ether, such that the content of dipropylene glycol normal propyl ether is 0.5 to 5% by weight with respect to the total amount of the ink, would stabilize discharge from the recording head and improve straight travel stability while maintaining the improved fixation performance. Because of this unexpected result, Applicants respectfully assert that the narrow claimed ratio range of 0.5 to 5% is not disclosed by Kato with "sufficient specificity" to constitute an anticipation of the claims.

2. No Reason for Anticipation or Motivation for Obviousness

Kato provides neither reason for anticipation nor any motivation regarding obviousness. First, Kato never discloses any effect on straight travel stability or recording head discharge stability by adding dipropylene glycol normal propyl ether to an ink containing an acrylic polymer. The glycol ethers of Kato are disclosed as being penetrating agents. Kato, Col. 7, Lns. 47-52. As such there is no reason for anticipation of the unexpected results of the current application that the addition of dipropylene glycol normal propyl ether to an ink containing an acrylic polymer, such that the content of dipropylene glycol normal propyl ether is 0.5 to 5% by weight with respect to a total amount of the ink, improves the straight travel stability while maintaining the improved recovery performance and fixation performance obtained by the addition of the acrylic polymer.

Second, Kato teaches improving color development and fixation by the addition of a first and second colorant to the ink. Kato, Col. 3, Lns. 61-65. Never does Kato discuss any interaction between dipropylene glycol normal propyl ether and an acrylic polymer. In fact, the acrylic polymer in Kato is disclosed as a dispersant for the second colorant, rather than for use to improve recovery performance and fixation performance. Kato, Col. 3., Lns. 66-67; Col. 5, Lns. 1-7 and 45-50.

As a result, Kato provides no motivation to solve the problems addressed in the current application by modifying the proportion of dipropylene glycol normal propyl ether to the acrylic polymer. As such, Kato does not render the narrowly claimed ratio range of 0.5 to 5% obvious.

In addition, Claim 10 is dependant upon Claim 7. As Claim 7 is allowable, so must be Claim 10.

Examiner asserts that Kato renders Claim 10 obvious because the claimed range of 0.5 to 5% of Claim 10 overlaps the range of 1 to 20% disclosed in Kato. 8/29/06 Office Action, P. 4. While this may be true in some cases, it is not so in the present case. As stated above, the narrower claimed range of 0.5 to 5% of Claim 10 has unexpected results. These unexpected results negate the fact that the claimed range overlaps the range disclosed in Kato, and renders Claim 10 unobvious. See MPEP § 2131.03. It would not have been obvious to one of ordinary skill in the art to modify the disclosed range of 4 to 10% to come up with the claimed range of 0.5 to 5% because, as stated above, the results were unexpected.

Furthermore, Examiner asserts that there is no evidence in the Application to support the asserted unexpected results. However, Table 12 provides just such evidence. Examples 4 and 5 contain dipropylene glycol normal propyl ether in the specified amount. This demonstrates the importance of the amount being within the range of 0.5 to 5%.

As such, Applicants respectfully assert that Claim 10 is not rendered obvious by Kato. Therefore, Applicants respectfully request that Examiner remove the rejection of Claim 10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,440,203 to Kato.

D. CLAIM 11

Claim 11 is dependant upon Claim 7. As Claim 7 is allowable, so must be Claim 11. Therefore, Applicants respectfully request that Examiner remove the rejection of Claim 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,440,203 to Kato.

E. CLAIM 12

Claim 12 is dependant upon Claim 7. As Claim 7 is allowable, so must be Claim 12. Therefore, Applicants respectfully request that Examiner remove the rejection of Claim 12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,440,203 to Kato.

V. REJECTION OF CLAIMS 7 AND 10-12 UNDER 35 U.S.C. § 103(A) BASED ON SEGAWA

In paragraphs 6 and 7 of the current Office Action, the Examiner rejects claims 7 and 10-12 under 35 U.S.C. § 103(a) as being anticipated by Segawa. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Segawa claims priority from a Japanese patent application, not a PCT application or a U.S. provisional application. As a result, the 102(e) date for Segawa is it U.S. filing date, February 13, 2003. As stated above, the current application claims priority to JP 2002-277600 filed on September 24, 2002. A verified translation of the priority document has been previously filed in this case. As a result, the date of invention for the current application predates the 102(e) date of Segawa. Thus, Segawa cannot be a proper 102(e) reference against the current application.

The Examiner has indicated in paragraph 7 that the current application is not entitled to the priority date of the priority document, because "there appears to be no disclosure in the foreign priority document regarding the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer as presently claimed." However, as explained below, this misinterprets the disclosure of the verified translation of the priority document ("Verified Translation").

It should first be noted that all that is required of the disclosure of the Verified Translation is that it disclose that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer **may** be 0.5 to 2 on the basis of weight. It is **not required** that the Verified Translation disclose that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer **must** be 0.5 to 2 on the basis of weight.

The priority document clearly states that "[i]t is preferable that the blending amount of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether is preferably 0.2 to 10 % by weight with respect to the total amount of the ink for ink-jet recording of the present invention." Verified Translation, ¶ [0014]. The priority document also clearly states that the blending amount of the acrylic polymer "is preferably 0.1 to 5.0 % by weight with respect to the total amount of the ink for ink-jet recording of the present invention." Verified Translation, ¶ [0012].

This disclosure of the range of weight percentages means that the Verified Translation specifically discloses that the ink for ink-jet recording of the present invention

may contain (1) 0.2% by weight of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether and (2) 0.4% by weight of the acrylic polymer. This means that the Verified Translation discloses that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer may be 0.5 (0.2% / 0.4% = 0.5).

The disclosure of the range of weight percentages also means that the Verified Translation specifically discloses that the ink for ink-jet recording of the present invention may contain (1) 10% by weight of the tripropylene glycol normal butyl ether and/or the dipropylene glycol normal propyl ether and (2) 5.0% by weight of the acrylic polymer. This means that the Verified Translation discloses that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer may be 2 (10% / 5.0% = 2).

The disclosure of the **range** of weight percentages also means that the Verified Translation not only discloses that the blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer may be either 0.5 or 2, but also discloses that the blending ratio can be anything between 0.5 and 2. Thus, the language of Claim 7 that "a blending ratio of the dipropylene glycol normal propyl ether with respect to the acrylic polymer is 0.5 to 2 on the basis of weight", is in fact supported by the disclosure of the Verified Translation.

The verified translation discloses, in Examples 4 and 5, ink compositions each including dipropylene glycol normal propyl ether and acrylic polymer. See paragraphs [0030] – [0033].

Specifically, from Table 4 (paragraph [0031]) showing the ink composition of Example 4, it is calculated that the ratio on the basis of % by weight of dipropylene glycol normal propyl ether with respect to acrylic polymer is 2 (= (dipropylene glycol normal propyl ether: 1% by weight) / (polyacrylic acid sodium salt as the acrylic polymer: 0.5% by weight)).

Further, from Table 5 (paragraph [0033]) showing the ink composition of Example 5, it is calculated that the ratio on the basis of % by weight of dipropylene glycol normal propyl ether with respect to acrylic polymer is 0.67 (≈ (dipropylene glycol normal propyl ether: 1% by weight) / (salt of copolymer of acrylic acid/sulfonic acid monomer as the acrylic polymer: 1.5% by weight)).

Namely, Example 4 in the verified translation discloses the ratio of "2" which supports the upper limit of "2" in the range of 0.5 to 2 of the blending ratio of the dipropylene glycol normal propyl either with respect to the acrylic polymer on the basis of weight as

recited in claim 7; and Example 5 of the verified translation discloses the ratio of "0.67" which is within the range of 0.5 to 2 of the blending ratio as recited in claim 7.

Therefore, Applicants respectfully request that Examiner remove the rejection of claims 7 and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application No. 2004/0024086 to Segawa et al.

Based upon the above remarks, Applicant respectfully requests reconsideration of this application and its early allowance. Should the Examiner feel that a telephone conference with Applicant's attorney would expedite the prosecution of this application, the Examiner is urged to contact him at the number indicated below.

Respectfully submitted,

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